

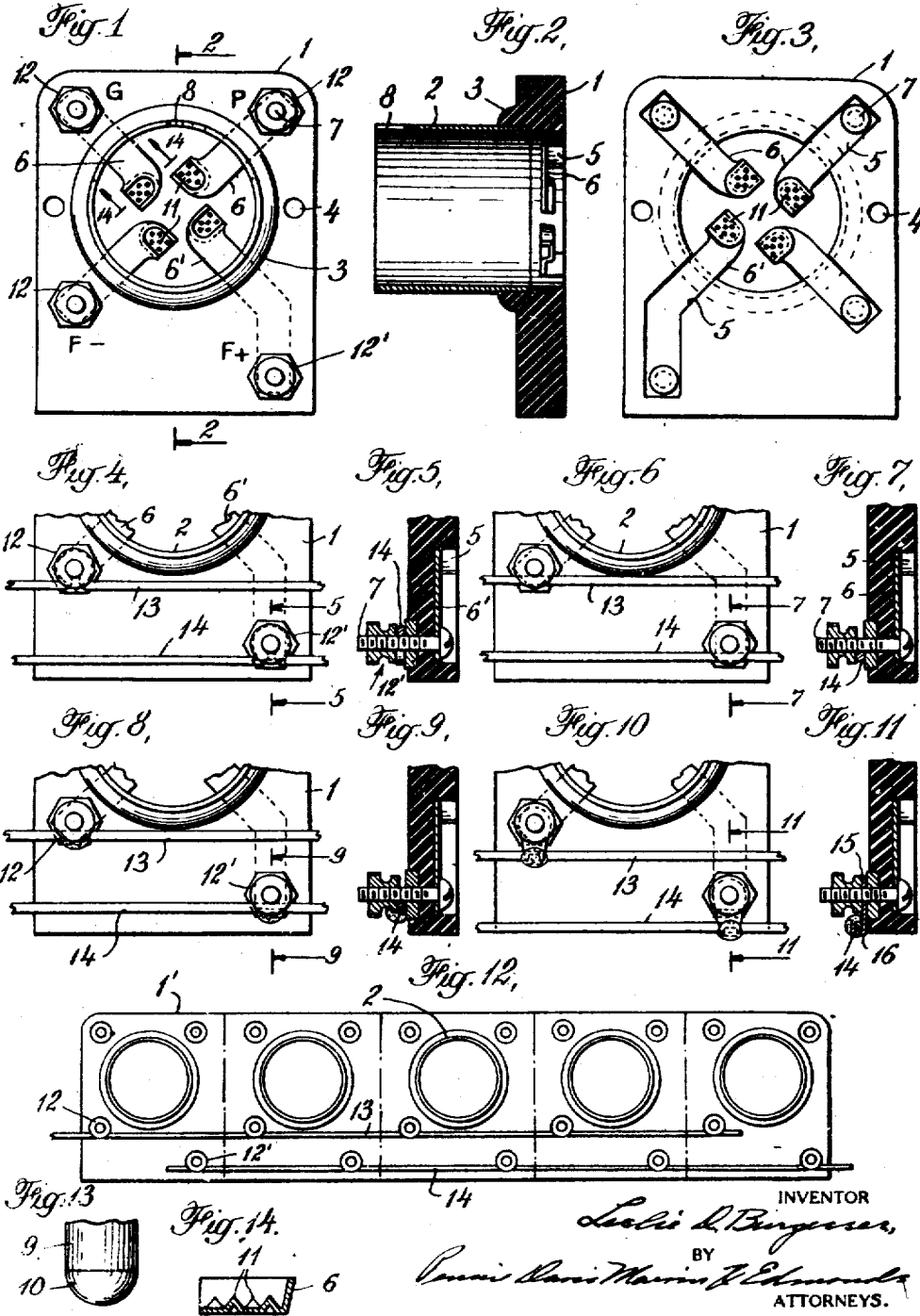
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TUBE SOCKET

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TUBE SOCKET.

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This invention relates to vacuum tube sockets and more particularly to sockets of this character constructed so that the necessary electrical connections can be made in the most efficient manner.

Heretofore, in making sockets for radio vacuum tubes, it has been the practice to provide a socket base of suitable material and having an upright socket member supported thereby. The vacuum tube is placed in this upright socket member and the electrical connections to the terminals of the tube are made by means of a plurality of strips of copper or other suitable metal usually secured to the socket base and projecting into the space at the bottom of the socket member. There are usually four of these conducting strips arranged so that they engage corresponding terminals projecting downward from the vacuum tube. The conducting strips are connected to four binding posts mounted on the base and arranged at equal intervals around the socket member proper. The vacuum tube is connected in circuit by connecting wires to the several binding posts arranged around the socket.

The connecting strips used for the purpose of engaging the terminals of the vacuum tube are usually in the form of flat springs, each of which is secured at one end thereof to the base of the socket. The free ends of the conducting strips project in toward the center of the bottom of the socket member and when the tube is inserted, the conducting strips are held quite firmly against the terminals of the tube by the spring action of the strips. The terminals of the ordinary vacuum tube are rounded off and accordingly there is only point contact between each of these terminals and the corresponding spring conducting strips with which they come in contact. In spite of the spring action of the conducting strips, it is seldom that good electrical contact is made between the strips and the terminals of the tube. Any film of oxides or grease or any foreign substance on the conducting strips naturally prevents the terminals of the tube from making good contact.

One of the objects of my invention is to provide improved contact strips on a socket of the character described, whereby contact is made with each terminal of the vacuum tube at a number of points, the con-

tact at each point being substantially better than that which can be obtained by the use of the ordinary contact. I have found that if one or more sharp projections are placed on each of the conducting strips in such a manner that they scrape against the terminals of the vacuum tube when it is inserted in the socket, a very good electrical contact is made at the places where the terminals are scraped. I prefer to provide a number of these projections on each of the conducting strips so that contact is made with each of the terminals of the vacuum tube at a plurality of points. It is quite satisfactory to provide these projections on the contact strips by stamping the ends of the strips with suitable dies so as to form a number of raised portions projecting upward when the strip is mounted on the socket base.

Another important feature of my invention relates to the manner in which the binding posts of my improved socket are arranged for connection to the bus wires usually employed in constructing radio sets. I prefer to provide at least one of the conducting strips above described, of greater length than the other strips, and to arrange these longer strips so that they can be connected to binding posts arranged further away from the center of the socket than is the case with the other binding posts on the socket base. The binding posts are arranged so that two bus wires arranged parallel to each other can be directly connected to two adjacent binding posts without the danger of having the bus wires come in contact with each other. My invention makes it possible to use two straight bus wires arranged in the same horizontal plane and directly connected to two adjacent terminals or binding posts of the vacuum tube socket. Heretofore, it has been necessary to extend the bus wires along the side of the socket and make short connections from the bus wires to the respective binding posts. This necessarily involves considerable labor and is also objectionable because of the increased resistance due to the large number of connections required. This feature of my invention makes it of particular value where a plurality of vacuum tube sockets are arranged side by side or formed on a single socket base. Where this is done, the bus wires can be directly connected to the bind-

ing posts on the adjacent sockets without bending them or arranging them in different horizontal planes.

My invention can be best understood by considering the following detailed description which is to be taken in conjunction with the accompanying drawings, in which Figure 1 is a plan view of my improved vacuum tube socket.

Figure 2 is a longitudinal section view taken on line 2—2 of Figure 1.

Figure 3 is a bottom plan view of the socket shown in Figures 1 and 2.

Figures 4 and 5 are fragmentary plan and section views respectively of my improved socket showing one method of attaching bus wires thereto.

Figures 6 and 7 are fragmentary plan and section views of my improved socket showing another method of connecting the bus wires thereto.

Figures 8 and 9 are fragmentary plan and section views of my improved socket showing still another method of connecting the bus wires to the socket.

Figures 10 and 11 are fragmentary plan and section views respectively of my improved socket showing a fourth method of connecting bus wires to the socket.

Figure 12 is a plan view of a composite socket comprising a single piece supporting a plurality of upright socket members.

Figure 13 is a fragmentary elevation of one of the terminals of an ordinary vacuum tube, showing the construction of the lower end of the terminal, and

Figure 14 is a vertical section view taken on line 14—14 of Figure 1, showing the construction of one of my improved contact strips.

The embodiment of my invention shown in Figures 1 to 11 inclusive of the accompanying drawings includes a socket base, the length of which is preferably greater than the width thereof. The exact dimensions of the base are not of any particular importance except from the standpoint of utilizing as little space as possible. The reason why I prefer to use a base the length of which is greater than the width, will appear as this description proceeds. The socket base 1 has an opening therein adapted to receive an upright socket member 2. The opening in the base is provided with a shoulder on which the member 2 rests, as best shown in Figure 2, and if it is so desired, the base may be provided with a collar 3, encircling the base of the socket member 2. The socket member 2 is preferably the ordinary type of socket member adapted to receive any of the common types of vacuum tubes, this socket member being made of metal or other suitable material as the case may be. The socket base may of course be provided with a number of screw openings 4

through which screws may be inserted for the purpose of securing the base to the mounting board of a radio set, or to any other support.

In addition to the large opening for the upright socket member 2, the socket base is preferably provided with a plurality of grooves or channels 5. These channels are adapted to receive contact strips 6. The contact strips 6, which are made of copper or other suitable material, each have one end thereof firmly held in place by the head of a bolt 7 which forms part of a binding post projecting above the socket base. The free ends of the contact strips project into the large opening in the socket base and these strips are constructed and arranged so that the free ends thereof occupy positions directly below corresponding terminals of the vacuum tube (not shown in the drawing.) The upright socket member 2 has a notch 8 near the top thereof which serves as a means for determining which of the terminals of a tube inserted in the socket, engage certain of the contact strips 6, as is well understood.

The terminals of ordinary vacuum tubes are constructed as shown in Figure 13. The tube is provided with a plurality of these terminals projecting down from the base of the tube. Each terminal comprises a tubular post 9 through which a wire connected to one element of the tube extends. This wire (not shown) is sealed at the bottom of the post 9 by applying a drop of solder 10 to the bottom of the post. This forms a rounded end substantially as shown in Figure 13. In order that these terminals of the vacuum tube may be brought into good electrical contact with the contact strip 6, I provide a plurality of sharp projections 11 at the end of each contact strip, as best shown in Figure 14. These projections can be made in any convenient manner such as by stamping the ends of the contact strips with suitable dies. This can be done so as to form a small cup at the free end of each contact strip, the projections extending up from the bottom of this cupped portion of the strip. If only one projection were formed on each of the contact strips, this would serve to make good electrical connection with the adjacent vacuum tube terminal. Where a number of these projections are formed, however, the chances of securing good electrical contact are multiplied accordingly. Thus, where the ends of the tube terminals are rounded as shown in Figure 13, these ends will engage three projections on the adjacent contact strip and perhaps the side of the cupped portion as well, thus insuring very good electrical contact. The spring action of the contact strips serves to hold them firmly against the terminals of the vacuum tube.

Upon referring to the accompanying

drawings, it will be noted that one of the contact strips is of different shape than the other strips. This particular contact strip is designated 6' and as shown in the drawing, comprises two portions. One portion is of substantially the same dimensions as any one of the contact strips 6; the other portion consists of an integral extension formed at an angle to the first portion and connected to a binding post 12' located at a point further away from the upright socket member 2 than the other terminals 12. The reason why I locate the binding post 12' at this remote point is so that bus wires can be directly secured to the binding posts as shown in Figures 4 to 11 inclusive. This explains why it is that I prefer to use a socket base, the length of which is somewhat greater than the width thereof. The binding posts shown in Figure 1 are arranged so that a number of the improved sockets can be placed side by side and two straight bus wires directly connected to the binding posts 12' and the nearest binding posts designated 12. By referring to Figure 4, it will be noted that the bus wire 13 is connected to the binding post 12, which is nearest to the binding post 12'. A second bus wire 14 is connected to the binding post 12'. The two bus wires 13 and 14 are arranged parallel to each other and in the same horizontal plane. If the binding posts 12 and 12' were in the same straight line, as is ordinarily the case, it would be necessary to make separate short connections to the bus wires. The conducting strip 6' could of course be made perfectly straight in which case it would extend from the proper point in the socket opening directly to the binding post 12'. The only objection to this is that there might be danger of the strip 6' coming in contact with one of the adjacent strips 6.

There are various ways in which the bus wires can be connected to the socket binding posts. The method shown in Figures 4 and 5 contemplates the formation of loops at suitable intervals along the bus wires, the loops being adapted to extend around the binding post studs 7. Where this is done, the bus wires are firmly fixed in place by merely tightening the binding post nuts. The method of connection shown in Figures 6 and 7 does not contemplate the formation of loops or bends of any character in the bus wires. In this case, the wires are merely brought adjacent to the binding post studs and held in this position while the binding post nuts are tightened. This holds the bus wires firmly in position but there is of course the danger that the wires will slip out from under the binding post nuts. To avoid this condition, loops can be formed as shown in Figures 4 and 5, or the methods of connection shown in Figures 8 to 11 in-

clusive can be used. In Figures 8 and 9, I have shown bus wires connected to the binding posts 12 and 12' in the manner shown in Figures 6 and 7, a drop of solder being placed on each binding post so as to secure the bus wires to the binding post nuts. It is to be noted that the solder does not come in contact with the binding post and accordingly the connection can be taken apart by applying a screw-driver to the head of the binding post stud. Figures 10 and 11 show the use of metal tabs 15 held in place by the binding post nuts and having hooks 16 thereon adapted to engage the bus wires 13 and 14. The hooks can be clamped against the bus wires or, preferably these parts can be fixed together by applying a drop of solder in such a manner as to solder the bus wires to the hooks 16.

My invention is particularly useful where a number of vacuum tube sockets are to be used side by side, as will be readily appreciated. One very convenient way of using my invention is shown in Figure 12. In this figure I have shown a large base plate 1' adapted to support a plurality of upright socket members 2. The broken lines appearing in this figure merely indicate the division lines between the socket units. The single base plate 1' carries all of the binding posts 12 and 12' and the two bus wires 13 and 14 are connected directly to the terminals as shown. The bus wires 13 and 14 can be connected to the binding posts in any convenient manner such as any one of those shown in Figures 4 to 11 inclusive.

The ordinary manufacturing processes employed in making vacuum tube sockets can be readily adapted to the making of my improved socket. The contact strips can be made out of common copper strips in a single stamping operation and the binding posts which are used in my improved socket are of the ordinary construction. It is merely necessary to provide means for supporting one or more of these binding posts at a point remote from the major portion of the binding posts. The socket base is likewise of ordinary construction except for the provision of space for supporting the offset binding post. The details of construction can be modified in various ways without departing from the spirit of my invention which is not limited to the particular embodiments illustrated and described, but includes such modifications thereof as fall within the scope of the appended claims. For example, the socket base may have any desired shape provided it is constructed in such a manner that the binding posts can be arranged as described. It is ordinarily sufficient to have the two binding posts which are connected to the filament of the tube arranged so that bus wires can be directly connected to these binding posts, but of

course the other binding posts can be arranged in a similar manner if it is so desired.

I claim:

5 1. A vacuum tube socket comprising a socket base, a tube holder carried by said base, a plurality of binding posts supported by said base and arranged close to said tube holder, and a binding post fixed to said base
10 at a point remote from said holder whereby two straight bus wires can be connected directly to two adjacent binding posts without coming into contact with each other.

15 2. A vacuum tube socket comprising a socket base, a tube holder supported thereby, three binding posts carried by said base and arranged close to said tube holder, a fourth binding post carried by said base at a point remote from said holder, whereby
20 two straight bus wires can be connected directly to the fourth and one of the other binding posts without coming into contact with each other, and a conducting strip connected to each binding post and extending
25 toward the center of the base of said tube holder, the said strips extending toward each other at substantially right angles to each other.

3. A vacuum tube socket comprising a
30 rectangular base, a tube holder supported by said base near one end thereof, a plurality of binding posts arranged close around said holder at equal distances from the center thereof, a binding post arranged near
35 the other end of said base, at a point remote from said holder, whereby two straight bus wires can be connected directly to the last mentioned binding post and an adjacent
40 binding post without coming into contact with each other, and conducting strips connected to each of said binding posts and extending into the base of said holder.

4. The combination of a rectangular
45 socket base plate, a plurality of vacuum tube holders mounted on said plate near one of

the long sides thereof, three binding posts mounted close to each of said holders and a fourth binding post for each holder whereby two straight bus wires can be connected
50 directly to the fourth binding post and an adjacent binding post without coming into contact with each other.

5. The combination of a rectangular socket base plate, a plurality of vacuum tube holders mounted on said plate, a plurality
55 of binding posts mounted close around each holder, a binding post for each holder mounted at a point remote therefrom so as to be set apart from the remaining binding posts, a bus wire connected directly to each
60 of the offset binding posts, and a bus wire parallel to the first-mentioned bus-wire connected directly to each of the binding posts adjacent to said offset binding posts.

6. A contact strip for a vacuum tube
65 socket having its free end formed with a cup-shaped portion having an open side adapted to receive a terminal of a vacuum tube.

7. A vacuum tube socket comprising
70 means for holding a vacuum tube, and a spring contact strip associated with said tube-holding means and having its free end formed with a cup-shaped portion having
75 an open side adapted to receive a terminal of a vacuum tube.

8. A vacuum tube socket comprising means for holding a vacuum tube, and a plurality of spring contact strips associated
80 with said tube-holding means and having their free ends formed with cup-shaped portions having an open side to receive the terminals of a vacuum tube, the open side of each cup-shaped portion being substantially
85 at right angles to the open side of the cup-shaped portion of the adjacent contact strips.

In testimony whereof I affix my signature.

LESLIE D. BURGESSER.

CERTIFICATE OF CORRECTION.

Patent No. 1,663,544.

Granted March 27, 1928, to

LESLIE D. BURGESSER.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 4, line 48, claim 4, after the word "holder" insert the words "mounted at a point remote from the holder"; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 1st day of May, A. D. 1928.

(Seal)

M. J. Moore,
Acting Commissioner of Patents.

course the other binding posts can be arranged in a similar manner if it is so desired.

I claim:

5 1. A vacuum tube socket comprising a socket base, a tube holder carried by said base, a plurality of binding posts supported by said base and arranged close to said tube holder, and a binding post fixed to said base
10 at a point remote from said holder whereby two straight bus wires can be connected directly to two adjacent binding posts without coming into contact with each other.

15 2. A vacuum tube socket comprising a socket base, a tube holder supported thereby, three binding posts carried by said base and arranged close to said tube holder, a fourth binding post carried by said base at a point remote from said holder, whereby
20 two straight bus wires can be connected directly to the fourth and one of the other binding posts without coming into contact with each other, and a conducting strip connected to each binding post and extending
25 toward the center of the base of said tube holder, the said strips extending toward each other at substantially right angles to each other.

30 3. A vacuum tube socket comprising a rectangular base, a tube holder supported by said base near one end thereof, a plurality of binding posts arranged close around said holder at equal distances from the center thereof, a binding post arranged near
35 the other end of said base, at a point remote from said holder, whereby two straight bus wires can be connected directly to the last mentioned binding post and an adjacent
40 binding post without coming into contact with each other, and conducting strips connected to each of said binding posts and extending into the base of said holder.

45 4. The combination of a rectangular socket base plate, a plurality of vacuum tube holders mounted on said plate near one of

the long sides thereof, three binding posts mounted close to each of said holders and a fourth binding post for each holder whereby two straight bus wires can be connected directly to the fourth binding post and an adjacent binding post without coming into contact with each other. 50

5. The combination of a rectangular socket base plate, a plurality of vacuum tube holders mounted on said plate, a plurality
55 of binding posts mounted close around each holder, a binding post for each holder mounted at a point remote therefrom so as to be set apart from the remaining binding posts, a bus wire connected directly to each of the offset binding posts, and a bus wire parallel to the first-mentioned bus-wire connected directly to each of the binding posts adjacent to said offset binding posts. 60

6. A contact strip for a vacuum tube socket having its free end formed with a cup-shaped portion having an open side adapted to receive a terminal of a vacuum tube. 65

7. A vacuum tube socket comprising means for holding a vacuum tube, and a spring contact strip associated with said tube-holding means and having its free end formed with a cup-shaped portion having an open side adapted to receive a terminal
75 of a vacuum tube.

8. A vacuum tube socket comprising means for holding a vacuum tube, and a plurality of spring contact strips associated with said tube-holding means and having
80 their free ends formed with cup-shaped portions having an open side to receive the terminals of a vacuum tube, the open side of each cup-shaped portion being substantially at right angles to the open side of the cup-shaped portion of the adjacent contact strips. 85

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